

Editorial

Acute myocardial infarction: bring the treatment to the patient

In the early 1980s it was determined that a myocardial infarction is usually caused by an acute thrombotic obstruction of a coronary artery. Since that time various pharmacological and mechanical treatment strategies have been developed that aim at rapid, complete, and persistent reperfusion of intracoronary blood flow. In general, these reperfusion strategies contributed considerably to improving the patient's prognosis, both short and long term.¹⁻⁵ There are, however, differences in clinical effectiveness between several treatment strategies, and the combined evidence of randomised clinical trials is favourable for primary percutaneous transluminal coronary angioplasty (PTCA) compared with administration of a thrombolytic agent.² This, however, does not imply that the mechanical approach should be the strategy of choice in all circumstances.

Experimental studies demonstrated that necrosis of viable myocardial tissue mainly happens during the 30 to 90 minutes following coronary occlusion. Consequently, if the coronary artery can be reperfused during this period, extensive myocardial necrosis can be prevented and left ventricular function can be preserved, which improves patient survival. Indeed, the mortality reduction by thrombolytic treatment compared with control is considerably higher in patients treated within two hours of symptom onset compared with those treated later.⁶ Thrombolytic treatment during the first hour resulted in a 50% mortality reduction, which indicates 50 to 60 lives saved per 1000 patients treated.⁶ Minimising treatment delay is therefore of vital importance. The challenge in clinical practice is to initiate reperfusion within the first two to three hours after onset of symptoms.

One way to reduce the delay is to bring the treatment to the patient. Several investigations have demonstrated that initiation of thrombolytic treatment at the patient's home, before hospital admission, reduces the treatment delay by about an hour.⁶ Meta-analysis of all randomised trials of prehospital versus in-hospital thrombolysis shows that reducing treatment delay by an hour saves approximately 20 lives per 1000 treated.⁶ This figure is strikingly similar to the additional benefit of primary angioplasty compared with in-hospital thrombolysis as observed in clinical trials. Obviously, PTCA cannot be performed out-of-hospital within the first "golden hour" after coronary occlusion. In fact catheterisation laboratory intervention may result in additional treatment delays, even in hospitals adequately equipped for and experienced in this mode of treatment.

The safety of prehospital thrombolysis strongly depends on the possibilities of rapid and correct diagnosis in the prehospital setting.⁷ Because of the—be it moderate—risk of severe bleeding complications associated with thrombolytic agents, inappropriate treatment should be avoided in patients with suggestive symptoms, but without developing an infarction. To rule out myocardial infarction in the Dutch prehospital thrombolysis programmes a standard 12 lead ECG is recorded and interpreted either on-site by a computer program or, after telephone transmission, by a cardiologist at the coronary care unit.^{8,9} This approach has

proved to be safe: to date, almost 2000 patients have been treated with < 1% false positive diagnosis.

Prehospital thrombolysis is not only a rapid, safe, and effective treatment strategy, but also cost effective and almost universally applicable. The costs of training ambulance personnel and purchasing the diagnostic tools are limited. In contrast, primary angioplasty is an expensive treatment strategy, and can only be applied in hospitals with adequate facilities, which drastically limits the number of patients eligible for such invasive treatment.

The ideal reperfusion strategy does not exist: prehospital thrombolysis enables very early treatment but does not always result in an open coronary artery, whereas PTCA almost always results in complete and persistent reperfusion but can only be performed in selected hospitals. Therefore, both approaches should be considered as complementary parts of an umbrella reperfusion strategy.¹⁰ The first element of such a strategy should be to increase public awareness of the need to reduce delay in seeking medical help for cardiac symptoms. Furthermore, the tools of the general practitioner and ambulance personnel for prehospital diagnosis should be increased and improved. Subsequently, after myocardial infarction has been diagnosed, the actual reperfusion treatment should be tailored to the clinical presentation of the individual patient and the local circumstances. The location and extent of the jeopardised myocardium at risk, the risk of bleeding complications, and the time from onset of symptoms will play key roles in decision making.

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